[0034] FIG. **9**B is a schematic view of an epicyclic gear train having a second example geometry ratio.

[0035] FIG. **9**C is a schematic view of an epicyclic gear train having a third example geometry ratio.

[0036] FIG. **10** is a nomograph depicting the interrelationship of speeds of epicyclic gear train components for a given geometry ratio.

[0037] FIG. **11**A is a schematic view of an epicyclic gear train having the first geometry ratio with a carrier rotating in the opposite direction to that shown in FIG. **9**A.

[0038] FIG. **11**B is a schematic view of an epicyclic gear train having the second geometry ratio with a carrier rotating in the opposite direction to that shown in FIG. **9**B.

[0039] FIG. **11**C is a schematic view of an epicyclic gear train having the third geometry ratio with a carrier rotating in the opposite direction to that shown in FIG. **9**C.

DETAILED DESCRIPTION

[0040] FIG. **1** schematically illustrates a gas turbine engine **20**. The gas turbine engine **20** is disclosed herein as a two-spool turbofan that generally incorporates a fan section **22**, a compressor section **24**, a combustor section **26** and a turbine section **28**. Alternative engines might include an augmentor section (not shown) among other systems or features. The fan section **22** drives air along a bypass flowpath B while the compressor section **24** drives air along a core flowpath C for compression and communication into the combustor section **26** then expansion through the turbine section **28**. Although depicted as a turbofan gas turbine engine in the disclosed non-limiting embodiment, it should be understood that the concepts described herein are not limited to use with turbofans as the teachings may be applied to other types of turbine engines including three-spool architectures.

[0041] The engine **20** generally includes a low speed spool **30** and a high speed spool **32** mounted for rotation about an engine central longitudinal axis A relative to an engine static structure **36** via several bearing systems **38**. It should be understood that various bearing systems **38** at various locations may alternatively or additionally be provided.

[0042] The low speed spool **30** generally includes an inner shaft **40** that interconnects a fan **42**, a low pressure (or first) compressor section **44** and a low pressure (or first) turbine section **46**. The inner shaft **40** is connected to the fan **42** through a geared architecture **48** to drive the fan **42** at a lower speed than the low speed spool **30**. The high speed spool **32** includes an outer shaft **50** that interconnects a high pressure (or second) compressor section **52** and high pressure (or second) turbine section **54**. A combustor **56** is arranged between the high pressure compressor **52** and the high pressure turbine **54**. A mid-turbine frame **57** of the engine static structure **36** is arranged generally between the high pressure turbine **54** and the low pressure turbine **46**. The mid-turbine frame **57** supports one or more bearing systems **38** in the turbine section **28**. The inner shaft **40** and the outer shaft **50** are concentric and rotate via bearing systems **38** about the engine central longitudinal axis A, which is collinear with their longitudinal axes. As used herein, a "high pressure" compressor or turbine experiences a higher pressure than a corresponding "low pressure" compressor or turbine.

[0043] The core airflow C is compressed by the low pressure compressor **44** then the high pressure compressor **52**, mixed and burned with fuel in the combustor **56**, then expanded over the high pressure turbine **54** and low pressure turbine **46**. The mid-turbine frame **57** includes airfoils **59** which are in the core airflow path. The turbines **46**, **54** rotationally drive the respective low speed spool **30** and high speed spool **32** in response to the expansion.

[0044] The engine **20** in one example is a high-bypass geared aircraft engine. In a further example, the engine **20** bypass ratio is greater than about six (6), with an example embodiment being greater than ten (10), the geared architecture **48** is an epicyclic gear train, such as a star gear system or other gear system, with a gear reduction ratio of greater than about 2.3 and the low pressure turbine **46** has a pressure ratio that is greater than about 5. In one disclosed embodiment, the engine **20** bypass ratio is greater than about ten (10:1), the fan diameter is significantly larger than that of the low pressure compressor **44**, and the low pressure turbine **46** has a pressure ratio that is greater than about 5:1. Low pressure turbine **46** pressure ratio is pressure measured prior to inlet of low pressure turbine **46** as related to the pressure at the outlet of the low pressure turbine **46** prior to an exhaust nozzle. It should be understood, however, that the above parameters are only exemplary of one embodiment of a geared architecture engine and that the present invention is applicable to other gas turbine engines including direct drive turbofans.

[0045] A significant amount of thrust is provided by the bypass flow B due to the high bypass ratio. The fan section **22** of the engine **20** is designed for a particular flight condition—typically cruise at about 0.8 Mach and about 35,000 feet. The flight condition of 0.8 Mach and 35,000 ft, with the engine at its best fuel consumption—also known as "bucket cruise Thrust Specific Fuel Consumption ("TSFCT")"—is the industry standard parameter of lbm of fuel being burned per hour divided by lbf of thrust the engine produces at that minimum point. "Fan pressure ratio" is the pressure ratio across the fan blade alone, without a Fan Exit Guide Vane ("FEGV") system. The low fan pressure ratio as disclosed herein according to one non-limiting embodiment is less than about 1.45. "Low corrected fan tip speed" is the actual fan tip speed in ft/sec divided by an industry standard temperature correction of [(Tram deg R)/518.7)^0.5]. The "Low corrected fan tip speed" as disclosed herein according to one non-limiting embodiment is less than about 1150 ft/second.

[0046] An example geared architecture **48** for the engine **20** is shown in FIG. **2**. Generally, the engine static structure **36** supports the inner and outer shafts **40**, **50** for rotation about the axis A. The outer shaft **50** supports the high pressure compressor section **52** and the high pressure turbine section **54**, which is arranged upstream from the mid turbine frame **59**.

[0047] The inner shaft **40** is coupled to the geared architecture **48**, which is an epicyclic gear train **60** configured in a differential arrangement. The gear train **60** includes planetary gears **64** supported by a carrier **62**, which is connected to the inner shaft **40** that supports the low pressure turbine **46**. A sun gear **66** is centrally arranged relative to and intermeshes with the planetary gears **64**. A ring gear **70** circumscribes and intermeshes with the planetary gears **64**. In the example, a fan shaft **72**, which is connected to the fan **42**, is rotationally fixed relative to the ring gear **70**. The low pressure compressor **44** is supported by a low pressure compressor rotor **68**, which is connected to the sun gear **66** in the example.

[0048] The carrier **62** is rotationally driven by the low pressure turbine **46** through the inner shaft **40**. The planetary gears **64** provide the differential input to the fan shaft **72** and low pressure compressor rotor **68** based upon the geometry ratio, which is discussed in detail in connection with FIGS. **9A-10**.